

WHAT IS CLAIMED IS:

1. A magnetic thin film, characterized in comprising an iron nitride thin film formed on a substrate using an opposed-target DC sputtering method by means of reactive sputtering with N₂ gas.

2. A magnetic thin film, characterized in that iron (α - Fe) thin films and iron nitride thin films are alternately deposited on a substrate by means of an opposed-target DC sputtering method.

3. A magnetic thin film manufacturing method comprising a manufacturing method for iron nitride thin films employing an opposed-target DC sputtering method, characterized in that Ar and N₂ gases are introduced into a film formation chamber, DC power is applied to an iron target in the Ar and N₂ gas atmosphere, and an iron nitride thin film is formed on a substrate.

4. A magnetic thin film manufacturing method in accordance with claim 3, characterized in that a flow rate of said N₂ gas is within a range of 8 - 25% with respect to the total gas flow rate.

5. A magnetic thin film manufacturing method in accordance with one of claims 3 and 4, characterized in that the electron temperature during the formation of the iron nitride thin film is within a range of 0.01 - 1 eV, and the electron density is within a range of 1×10^9 - 1×10^{10} cm⁻³.

6. A magnetic thin film manufacturing method in accordance with one of claims 3 through 5, characterized in that said

25 substrate has an iron (α - Fe) thin film (001) surface formed
thereon as a base layer.

 7. A magnetic thin film manufacturing method in accordance
with one of claims 3 through 6, characterized in that after iron
nitride thin film formation, heat treatment is conducted in a
30 vacuum.

 8. A magnetic thin film manufacturing method in accordance
with claim 7, characterized in that the conditions of said heat
treatment are such that the temperature is within a range of 100
- 180° C, and treatment is conducted for a period of time within
35 a range of 1 - 3 hours.

 9. A magnetic thin film manufacturing method in accordance
with one of claims 3 through 8, characterized in that said iron
nitride thin film contains an α'' crystalline phase (Fe_{16}N_2).